

New Frogs from Ecuador and Southwestern Colombia

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(Plate I)

In the course of collecting in Ecuador in 1950, several undescribed frogs were discovered. Descriptions of two of these new forms are presented here, along with field observations on them. In addition, two more new forms from collections sent to me by Mr. Rolf Blomberg and Dr. Gustavo Orcés V. of Quito are described. These frogs represent three genera and two families.

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Much confusion exists in the classification of the *tinctorius* group of *Dendrobates* from Central America and northern South America, and I am greatly indebted to Dr. E. R. Dunn for information concerning the relationships and ranges of some of the members of this group. Most of the information on these points is taken from his letters.

DENDROBATES HISTRIONICUS SYLVATICUS, n. ssp.
(Plate I, Fig. 1)

Diagnosis.—A form of *Dendrobates histrionicus* Berthold (1845a, b) most closely related to *Dendrobates h. wittei* Laurent (1942) (the latter figured by Boulenger [1913: pl. CIV, fig. 4] as *Dendrobates tinctorius coctaei*), from which it differs in having strikingly smaller and more closely spaced markings, those of the dorsum having very irregular and frequently poorly defined margins so that in some cases the color of the markings shades into the background. The markings of the venter tend to be slightly larger than those of the dorsum and have well defined, regular margins. In life all markings are bright vermilion upon a shiny, jet-black ground, in preservative becoming much less distinct and changing to blue-gray upon a gray-black background.

Holotype—SU¹10568, an adult, 27 mm. snout to vent, from the Hacienda Espinosa, elevation about 1,000 ft., 9 km. west of Santo Domingo

de los Colorados, Province of Pichincha, northwestern Ecuador. Collected by John W. Funkhouser on Oct. 2, 1950.

Paratypes.—SU 10566-10567, 10569-10576, same locality data, collected between Oct. 2 and Dec. 2, 1950, by the author; SU 10383, vicinity of Santo Domingo de los Colorados, May, 1950, by Sr. Muñoz; SU 10380-10381, banks of rivers Pupusa and Quila, near Santo Domingo de los Colorados, by Sr. Muñoz; SU 10615, Hacienda Lelia, $\pm 3,000$ ft., about 35 km. east of Santo Domingo de los Colorados in the Andean foothills on the road to Quito, Sept. 3, 1950, by the author; and SU 10360-10361, $\pm 1,500$ ft., on the Río Mulante, an affluent of the Río Blanco, Esmeraldas drainage, Province of Pichincha, by Sr. Antonio Proaño.

Description of Holotype.—Snout truncate, almost vertical in profile, the corners angular. Nostril to front corner of eye about three-fourths length of exposed part of eye. Internarial distance equal to exposed part of eye. Canthus rostralis indistinct. Loreal region vertical, slightly or not at all concave. Width of upper eyelid equal to two-thirds interorbital space, which is equal to exposed part of eye. Tympanum indistinct, equal to about half exposed part of eye. Width of head behind eyes about equal to length of head.

Finger I reaches to base of disk of II; finger II reaches to second joint of finger III; finger IV reaches very slightly farther on finger III than does II. The width of the disks of II, III and IV about equal and about twice the width of their digits; disk of I narrower, about one

¹The following abbreviations are used throughout this paper: AMNH, The American Museum of Natural History; ANS, Academy of Natural Sciences of Philadelphia; OV, private collection of Gustavo Orcés V.; SU, Natural History Museum, Stanford University; USNM, United States National Museum.

and a half times the width of its digit. Fingers free of webbing. A single oval palmar tubercle; subarticular tubercles readily visible, but not strongly developed.

Toe I marks the first joint of II; disk of I only slightly wider than toe, about half as wide as disk of II, which is almost twice as wide as toe II. Toe II reaches midpoint of first joint of III; disk of II about equal to that of III. Toe III reaches to last subarticular tubercle of IV and is about two-thirds the length of IV; disk of IV about equal to that of III. Toe V reaches to just below second subarticular tubercle of IV; disk of V about one and a half times as wide as toe and about two-thirds as wide as disk of IV. Widths of toes I and V about equal and equal to two-thirds the widths of II, III and IV. Subarticular tubercles readily visible, but not strongly developed; a round outer and an elliptic inner metatarsal tubercle; an indistinct tarsal tubercle. Heels overlap slightly when legs are folded at right angles to the body. When hind limbs are carried forward along the body, the tibiotarsal articulation marks the hind part of the eye. Snout to vent length slightly more than four times width of sacrum. Omosternum rudimentary.

Skin smooth on all surfaces. Dorsal markings closely spaced, small, irregular in outline, and inclined to run together in places or to shade into the background. Ventral markings larger and smoother outlined, but irregular in shape and size. On the limbs the markings may be present or absent, but when present are usually large with smooth margins. *In preservative* the background is gray-black and the markings a lighter gray. *In life* the background is shiny black and the markings bright vermilion.

Measurements of Holotype, in Millimeters.—Snout to vent 26; width of head (behind eyes) 8; length of head 8; length of orbit 4; length of exposed part of eye 3; interorbital distance 3; internarial distance 3; subocular distance 1.5; eye to tip of snout 4; eye to nostril 2.3; greatest diameter of tympanum 1.5; length of femur (vent to knee) 8; length of tibia (knee to heel) 10; length of longest toe (measured from far side of metatarsal tubercle) 12; length of foot (heel to tip of longest toe) 19.

Variation.—The coloration was the same in all specimens which I saw in the field. The size and spacing of the markings of the dorsum and venter vary minutely, but on the limbs vary greatly in size and number, or are totally absent. In no specimen examined are the limb markings as profuse as those of the dorsum and venter.

Distribution.—This frog occurs in the humid tropical forests of the coastal plain and Andean foothills of northwestern Ecuador. At present

it is impossible to establish its northern and southern limits, though it is reasonable to assume that the latter would coincide with the zone of transition to the drier regions of southwestern Ecuador. Specimens from San Javier (AMNH 10607) and Salidero (AMNH 10601-10603), northwestern Ecuador, appear to be of this type, but are in such a bad state of preservation that determining their original pattern with certainty is virtually impossible. Two specimens (USNM 20603-20604) from Playa de Oro, Province of Esmeraldas, have larger and fewer spots, one of these (USNM 20603) closely approaching *Dendrobates h. wittei* as figured by Boulenger (1913); the other has more and smaller spots. This may prove to be a zone of intergradation between the two subspecies.

Ecology and Behavior Notes.—I found these frogs to be diurnal and to inhabit the jungle floor. (The only exception to the latter which I saw occurred on the afternoon of October 14, 1950, when I took one and saw another crossing a trail through a grassy pasture. These were at least 50 yards from the edge of the jungle.) When not active, they remain hidden under leaves, logs and debris.

As far as I could determine, their activity increases markedly during and immediately after rain. I counted five in sight at once on the afternoon of October 22, 1950, after it had been raining for perhaps half an hour. These were in a spot in the jungle where a dense growth of large-leaved plants about two feet high covered the floor. The frogs were moving busily about, traveling in short walks or runs, with now and then a short hop. Occasionally one would climb to the top of a leaf as though to survey the situation. They seemed to be exploring every crevice, every stem, every leaf. Upon my approach, they became alarmed and moved back among the plants, adeptly hiding under debris. Capturing this species always presented a problem, and I was able to catch only one at this place.

Their locomotion is not rapid; their hops never cover more than three inches. In spite of their brilliant red and black coloration, they blend so well with spots of red fungus which grow on the jungle floor and with small flecks of light that they can easily be overlooked.

When captured they do not go through the kicking characteristic of most frogs, but try to wriggle away, using a walking or running motion with both hands and feet. Occasionally they lie perfectly still for a while and then suddenly become active.

They are extremely nervous and alert. In a specimen jar, they revolve this way and that looking for an avenue of escape. The throat

characteristically pulsates very rapidly, seeming to flicker. Occasionally this movement is stopped for a second or two.

As to voice, I heard only one specimen make a sound, and this individual kept up a steady clamor of annoyance while in the collecting bag and when handled. The sound was identical with that made by a wood borer in dead wood.

DENDROBATES HISTRIONICUS CONFLUENS, n. ssp.

Diagnosis.—A form of *Dendrobates histrionicus* very close to *D. h. sylvaticus* in every way except color pattern. The markings of the dorsal, and usually the lateral, surfaces are what would result if the vermilion spots of *sylvaticus* were to enlarge and merge until only small spots and flecks of the black background remained. Hands and feet black with light (presumably red in life) spots. Venter varying from all black to marbled to mostly light with large black spots (especially pronounced on the throat region). The collector reports these frogs "red" in life.

Holotype.—SU 13151, an adult 27 mm. snout to vent, from La Ciudad (de Madrigar), lying in the pass through the western Cordillera of the Río Patia, Department of Nariño, southwestern Colombia (approximately Long. 77° 30' W. × Lat. 1° 46' N.), at an elevation of ±600 mtr., collected by Rolf Blomberg on June 22, 1951.

Paratypes.—SU 13246-13267 (22 specimens), same locality data, collected Nov. 18, 1953, by Rolf Blomberg.

Description of Holotype.—Snout slightly rounded; slightly sloping in profile. Nostril to front corner of eye about three-fourths length of exposed part of eye. Canthus rostralis indistinct. Loreal region vertical; more or less plane. Width of upper eyelid two-thirds interorbital space, which is equal to exposed part of eye. Tympanum indistinct, its greatest diameter about half the length of the exposed part of the eye. Width of head behind eyes about equal to length of head.

Finger I reaches to base of disk of II; II reaches to second joint of III; IV reaches very slightly farther up on III than does II. Disks of II, III and IV about equal and almost twice the widths of their digits; of I narrower, not greatly wider than its digit. Fingers free of webbing. A single oval palmar tubercle; subarticular tubercles readily visible, but not strongly developed.

Toe I marks first joint of II. Disk of I only slightly wider than its toe, about half as wide as the disk of II, which is almost twice as wide as toe II. Toe II marks the middle of the first joint of III; disk of III slightly larger than disk of II. Toe III marks the middle of the penultimate phalanx of IV; disk of IV about equal to that of III. Toe V reaches to base of second subar-

ticular tubercle of IV; disk of V about half as wide as that of IV, intermediate in width between those of I and II. Subarticular tubercles readily visible, but not strongly developed. A round outer and an elliptic inner metatarsal tubercle; an indistinct tarsal tubercle. Heels overlap slightly when legs are folded at right angles to the body. The hind limb being carried forward along the body, the tibiotarsal articulation marks the eye. Snout to vent distance four and a half times the width of the sacrum. Omosternum rudimentary.

Skin appears smooth when viewed without magnification, but with magnification it appears, for the most part, punctate on all surfaces—the dark areas, however, much less strongly than the light. The dorsal pattern is made up of a light background on which are sparsely scattered, mostly small, irregularly margined dark spots and flecks. The ventral pattern is similar (though inclined to be marbled) except for the lower surfaces of the thighs, which are dark. Hands and feet dark with light spots. Color in preservative light pink (red-orange at time of receipt, six months preserved in *aguardiente*) with black or very dark gray markings. According to the collector, the background color in life is red.

Measurements of Holotype, in Millimeters.—Snout to vent 27; width of head (behind eyes) 8.2; length of head 8.2; length of orbit 4; length of exposed part of eye 3.5; interorbital distance 3.5; internareal distance 3; subocular distance 1.7; eye to tip of snout 4; eye to nostril 2.8; greatest diameter of tympanum 1.9; length of femur (vent to knee) 13; length of tibia (knee to heel) 14; length of longest toe (measured from far side of metatarsal tubercle) 12; length of foot (heel to tip of longest toe) 19.

Variation.—The paratypes vary in snout to vent length from 27 to 30 mm. The dorsal marking of all specimens is more or less the same, but on the venter the markings vary from all dark to marbled to mostly light with large dark spots (especially pronounced on the throat region).

Distribution.—I know of only the type locality (where, according to Blomberg, the collector, these frogs are quite abundant), but I believe that they very probably range throughout the tropical and even into the subtropical reaches of the Río Patia pass. Only future collecting can show how localized this form is and whether it ranges into the actual coastal foothills of the western Cordillera. Four specimens (ANS 25349-52) from La Guayacana, Department of Nariño, appear to be intermediate between *confluens* and *sylvaticus*, though closer to *confluens*. (La Guayacana lies in the pass through

the western Cordillera of the Río Guiza, approximately Long. 78° 19' W. × Lat. 1° 15' N. According to data with the specimens, its elevation is 3,000 ft. To judge from maps of the region, it is more likely very close to 1,000 ft.)

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As indicated above, Dr. Dunn has given me considerable information on this group of frogs. He plans to publish a report outlining their relationships and nomenclature at a future date, but I take the liberty of quoting briefly some of his conclusions as a basis for my own. *Dendrobates histrionicus* Berthold has long been relegated to the synonymy of *D. tinctorius*, but according to Dr. Dunn it has no close relationship to the latter, which comprises a group of tiny frogs with light stripes known from Panama to eastern Brazil and Guiana. *Dendrobates histrionicus* is made up of a group of larger, spotted forms occurring along the west coast of northwestern South America.

Dendrobates h. sylvaticus is replaced in the Pacific coastal plain of Colombia by *D. h. wittei* Laurent. In the western Andean foothill country of Nariño it is apparently replaced by *confluens*, or forms similar to *confluens* if the latter proves to be confined to the Río Patia pass. The previously mentioned specimens from La Guayacana lend credence to this view. These specimens show less confluence of the spots, especially on the sides of the body and upper surfaces of the limbs. However, their ventral markings tend strongly toward the marbling common to *confluens* rather than the individual ventral spots of *sylvaticus*. Their locality falls in a line between the known territories of *sylvaticus* and *confluens*, but closer in distance to the latter.

In view of the above findings, it appears that at least two lines diverge to the north from *sylvaticus*, one of these in the coastal plain and characterized by the enlargement and reduction in number of spots, and the other in the Andean foothills and characterized by the confluence of the spots so as almost (if not totally) to obscure the black background.

PHYLLOBATES ESPINOSAI, n. sp.²

(Plate I, Figs. 2 & 3)

Diagnosis.—A *Phyllobates* without light lateral stripes except for an irregular light line beginning in the groin and extending cephalad for about one-fourth of the groin-to-eye distance. Ventral surfaces strikingly marked by well defined, clear, light spots and vermiform markings on a dark brown background. Light markings

are blue in life, white in preservative. Tadpoles with normal mouth-parts.

Holotype.—SU 10577, an adult male from the Hacienda Espinosa, elevation about 1,000 ft., 9 km. west of Santo Domingo de los Colorados, Province of Pichincha, northwestern Ecuador. Collected by John W. Funkhouser, Oct. 6, 1950.

Paratypes.—SU 10578, 10585 (adults) and SU 10579-10584 (juveniles), same locality data, collected between Oct. 6 and Nov. 14, 1950, by the author; and SU 10375, Santo Domingo de los Colorados, May, 1950, by Sr. Muñoz.

Distribution.—I have knowledge only of the types listed above. A very similar *Phyllobates* from eastern Ecuador is discussed later in this paper.

Description of Holotype.—Snout truncate. Tip of snout to corner of eye about equal to orbit. Canthus indistinct; lores almost vertical. Nostrils nearer to tip of snout than to eye. Interorbital space equal to width of upper eyelid. Tympanum distinct, equal to almost one-half length of exposed part of eye.

Finger I longer than II, disk of II marking the middle of the ultimate phalanx of I. Tip of II reaches almost to end of penultimate phalanx of III. IV very slightly shorter than II. Disks of fingers only slightly wider than their respective penultimate phalanges except for III, which is swollen, its width being almost equal to disk. Fingers entirely free of webbing. A round central and a smaller oval inner palmar tubercle.

Toes II, III and IV slightly webbed at base. I reaches almost to first joint of II. Disks of I and II about equal, slightly smaller than disk of V, and about half of those of III and IV. Tip of II reaches first subarticular tubercle of III. III reaches second subarticular tubercle of IV. Tip of V falls about midway between first and second subarticular tubercles of IV. Diameter of toes I, II and V about equal, these being about one-half the diameter of IV, which is slightly larger than III. Subarticular tubercles not overly distinct. An oval inner and a more or less round outer metatarsal tubercle. An inner tarsal tubercle located at about the midpoint of the tarsus. Heels meet at midline when legs are folded at right angles to body. The hind limb being carried forward along the body, the tibiotarsal articulation marks the rear part of the eye.

Skin of dorsal surfaces finely granular; below smooth. *In preservative*, dorsal surfaces dark red-brown with slightly raised spots of darker brown, as are the lateral surfaces. Venter beautifully and distinctly marked by vermiform markings of clear blue-white on a deep brown

²To Sr. don Alfredo Espinosa P., of Quito, my host at the Hacienda Espinosa, I owe much of the success of the field work in Ecuador. I take pleasure in naming this species in his honor.

ground; throat has proportionately fewer markings, there being only a strong median and two lateral vermiform markings. An elongated white spot below eye, followed by a similar spot below tympanum (this may be continuous), which is followed by another spot leading to and then above, behind, and under juncture of forelimb to body, sending two branches down limb toward the elbow, one in front and one behind. A narrow, irregular stripe extending from groin about one-fourth of the distance between it and the hind-margin of the eye. Upper surfaces of thighs irregularly marked with light, there tending to be three diagonal markings. *In life*, dorsum deep red; sides black. Femur black; tibia deep red. All parts described as light in preservative, turquoise. Background color of venter, deep chocolate.

Measurements of Holotype, in Millimeters.—Snout to vent 17; width of head (behind eyes) 5.5; length of head 6; length of orbit 2.5; length of exposed part of eye 2; interorbital distance 2; internareal distance 2.5; subocular distance 1; eye to tip of snout 3; eye to nostril 2; greatest diameter of tympanum 1.2; length of femur (vent to knee) 7; length of tibia (knee to heel) 8; length of longest toe (measured from far side of outer metatarsal tubercle) 7; length of foot (heel to tip of longest toe) 12.

Variation.—In the four adult specimens dorsal variation is minute, the most notable being stronger or weaker markings on the upper surfaces of the thighs. Ventrally, the holotype possesses stronger markings (i. e., larger and proportionally more included area) than any of the adult paratypes. This is especially noticeable on the throats of the paratypes (that of SU 10585 being almost free of markings), though the tendency toward a median and two lateral throat markings remains. The abdominal markings of SU 10375 are mostly composed of round and oblong spots, the vermiform markings being greatly minimized. The ventral markings of the juveniles are poorly developed, the abdomens being mostly light and the throats dark, though in some the adult markings have begun to become defined. Snout to vent length of adult paratypes: 16-17 mm.

A specimen of *Phyllobates* (SU 10340) collected in the Río Suno Region, eastern Ecuador (Lat. 0° 40'-0° 44' × Long. 77° 10'-77° 20'; elevation 380-420 mtr.), by Jorge Olalla, was presented to me by Dr. Gustavo Orcés V. of the Escuela Politécnica Nacional, Quito. In preservation this specimen so closely resembles *P. espinosai* that I should be strongly inclined to place it in this species if its locality were not separated from the locality of *espinosai* by such a barrier as the Andes. The only morphological

difference between this and the adult specimens of *P. espinosai* which I have at hand is that it possesses a round, light blur covering the caudad two-thirds of the throat (possibly due to injury or preservation), has a white line bordering the upper lip and is slightly larger (19 mm. snout to vent).

Tadpole (Based on 3 tadpoles, SU 10586, collected from the back of paratype SU 10585).—Body 12 mm. long, somewhat depressed, four-fifths as broad as long; ventral profile slightly convex; no abdominal bulge. Eyes large, their longest diameter equal to almost one-fifth of body length, dorso-lateral in position and located in the second one-fifth of body length. Nostrils widely spaced, about half way between eye and tip of snout; internareal distance somewhat less than interorbital. Anus medial. Spiracle sinistral, slightly below the lateral axis and slightly nearer to base of tail than to tip of snout, its margin tubular and slightly projecting upward. Tail approximately twice body length. Fins well developed, the dorsal being distinctly keeled and having a maximum width of twice the ventral. Tip bluntly pointed.

Pigmentation in an even, close stippling of chromatophores on top of head and body. This extends about two-thirds of the way down the sides of the body and is continued on to the ventral side of the head where the stipples are spaced farther apart. Chromatophores of tail grouped into irregular spots with the individual chromatophores becoming smaller caudad. Chromatophores of ventral fin very sparse and small.

Rows of labial teeth 2/3, the teeth being of moderate size and crowding except for the third lower row where the teeth are minute and scarcely discernible. Second upper row divided, the middle one-third being vacant. The first lower row equal to or very slightly shorter than the two upper rows; the second lower row very slightly shorter than the first; and the third very slightly shorter than the second. Beaks narrowly edged with black; serrations comparable in size and spacing with the labial teeth; linear measurement from one side to the other equal to one-half of the first lower row of labial teeth. Upper beak broadly triangular; starting at the center the two sides first bow inward slightly, then outward. Lower beak also triangular with slightly narrower angle and the sides bowed very slightly inward. Single rows of papillae on lower and lateral labial margins forming three distinct series. The lower row is a continuous series below and lateral to the three lower tooth rows. Here the papillae number 22-28, are linearly arranged, and radiate outward. They are approximately twice as long as broad, are of fairly

uniform diameter—though tapering slightly to a blunt point—and are crowded closely together. A marked emargination separates this series from the series which lie one on either side, opposite and slightly overlapping the ends of the two upper rows of teeth. These series, each composed of five backwardly projecting papillae (the first and outer papilla difficult to see because of lying under the second) whose size and shape approximate those of the lower row, are connected by the labial margin which overlies the upper row of teeth to a depth of about $\frac{1}{2}$ their length.

Ecology and Behavior Notes.—My observations indicate that *Phyllobates espinosai* is a diurnal frog which inhabits damp, shaded areas of the jungle floor. Most of my specimens came from the banks of the small Río Chila, and I presume that the juveniles which I saw nowhere but in this location had spent their larval life in the stream and had metamorphosed just recently. Two adult males (SU 10578 and 10585) collected here were carrying tadpoles on their backs—two and three respectively. These were not arranged in any particular fashion on the back of the carrier.

The behavior of this species coincides almost exactly with that of other dendrobatids which I saw. They give the impression of extreme alertness, and all their movements are nervous and quick. They usually walk or run, or when greatly excited vigorously kick both hind legs out and back together in a swimming movement, at times projecting themselves an inch or two through the air (this is as close to a typical frog jump as they ever come). The throat pulsates rapidly, seeming to flicker; this movement occasionally is stopped for a second or two. Even when sitting the little creatures seem tense and alert. The head is elevated and the hind legs are tensed and not drawn in close to the body. When disturbed and seeking an avenue of escape, they squat in this position and revolve jerkily this way and that. In the field they scurry under debris for safety; they do not take to water even when it is close by.

The tadpoles share the adults' nervousness and are prone to sudden fits of movement. While I was collecting one of the adults carrying tadpoles, one of these slithered over the carrier's eye. With a quick movement of the forefoot he brushed it away, and at the same moment it projected itself some six inches across my hand. When these tadpoles were placed in a glass of water, they would lie quietly on the bottom and then suddenly take off in a frenzied dash around the glass. Their movements were always in darts, never a leisurely swim.

HYLA ORCESI, n. sp.³

Diagnosis.—Superficially similar to *Hyla leprieurii britti* Melin, from which it most notably differs in having an internal vocal sac instead of two external sacs behind the angles of the jaw. Upper surfaces densely covered with small conical tubercles, each having one or more spinose tips and densely covered with minute spines; a strong swelling or pad on the inside of the forearm (possibly a sexual character); uniform dark grayish-tan above.

Holotype.—SU 13150, an adult male from Pacayacu, a stream that flows into the Cotapino, drainage of the Suno, Río Napo region, eastern Ecuador; alt. 600-650 mtr. Collector not known.

Paratype.—O. V.—A. 101, personal collection of Dr. Gustavo Orcés V., Escuela Politécnica Nacional, Quito; an adult male from the same locality as the holotype.

Description of Holotype.—Derm of head not involved in cranial ossification. Omosternum a large cartilaginous disk. Choanae large. Vomerine teeth in two strong series, forming together a \neg , the transverse portions being at the level of the hind edge of the choanae and extending from choana to choana, while the diagonal portions extend behind the level of the choanae. Tongue subcircular, slightly free and slightly nicked behind. Head large, depressed, as broad as long. Lores oblique, concave; canthus rostralis distinct, slightly incurved. Snout rounded, one and a half times diameter of eye. Interorbital space a little broader than upper eyelid, equal to diameter of eye. Nostrils much nearer to tip of snout than to eye. Tympanum very distinct, two-thirds diameter of eye. A fold above tympanum and a noticeable concavity just dorsocaudal to it. Three outer fingers slightly webbed, a strong swelling on the inner side of first finger. Disks of three outer fingers about two-thirds diameter of tympanum, disk of first finger about half this size. Two palmar tubercles. A strong swelling, or pad on the inner side of the forearm, beginning at the elbow and extending two-thirds of the distance to the hand. Tibiotarsal articulation reaches between eye and tip of snout; length of femur one-half snout to anus. Heel without dermal appendage; a very indistinct tarsal fold. Feet three-fourths webbed; disks of toes 2-5 slightly smaller than those of outer three fingers; disk of first toe about two-

³Dr. Gustavo Orcés V. of the Escuela Politécnica Nacional, Quito, sent for my inspection two specimens of this very unusual *Hyla* from eastern Ecuador. These appear to be of an undescribed species, and Dr. Orcés has kindly donated the holotype to the Stanford Natural History Museum. In recognition of Dr. Orcés's many courtesies and favors, I take pleasure in naming the species in his honor.

thirds diameter of outer four. Subarticular tubercles well developed. A strongly developed inner, elliptic metatarsal tubercle. Male with internal vocal sac. Upper surfaces, with the exception of the forelimbs, densely covered with conical tubercles, each having one, or sometimes more, spinose tips and covered with small, usually dark spines; the skin between tubercles of a lichenaceous texture and bearing scattered small spines. Belly and lower surfaces of thighs coarsely granular. Coloration in preservative: dorsum brownish-gray with tips of tubercles whitish; tympanum yellowish-brown; venter light yellowish-brown studded with dark brown stipples visible under magnification. (Dr. Orcés states that he believes the color in life to be little different from that here described).

Measurements of Holotype, in Millimeters.—Snout to vent 52; width of head (behind eyes) 16; length of head 16; length of orbit 6.5; length of exposed part of eye 5; interorbital distance 5; internarial distance 4.5; subocular distance 2; eye to tip of snout 8; eye to nostril 5; width of upper eyelid 4; greatest diameter of tympanum 3.5; length of femur (vent to knee) 27; length of tibia (knee to heel) 26; length of longest toe (from far side of metatarsal tubercle) 32; length of foot (heel to tip of longest toe) 36.

Variation.—The paratype, measuring 50 mm. snout to vent, is more yellowish-brown on the dorsal surfaces, and the tips of its tubercles are more nearly the color of the background.

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Indebtedness is acknowledged to E. R. Dunn for the information which he has furnished on the *Dendrobates histrionicus-tinctorius* complex and for the loan of specimens in the Academy of Natural Sciences of Philadelphia. Thanks also go to The American Museum of Natural History and to the United States National Museum for their loans of specimens. Especial thanks go to Gustavo Orcés V. of the Escuela Politécnica Nacional, Quito, and to Rolf Blomberg of Quito for their donations of specimens, including two of the holotypes described in this paper.

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EXPLANATION OF THE PLATE

PLATE I

- FIG. 1. Dorsal view of *Dendrobates histrionicus sylvaticus* Funkhouser. (Charcoal drawing by Anne Funkhouser).
- FIG. 2. Ventral view of holotype of *Phyllobates espinosai* Funkhouser. (Charcoal drawing by Anne Funkhouser).
- FIG. 3. Mouthparts of tadpole of *Phyllobates espinosai* Funkhouser.



FIG. 1



FIG. 2

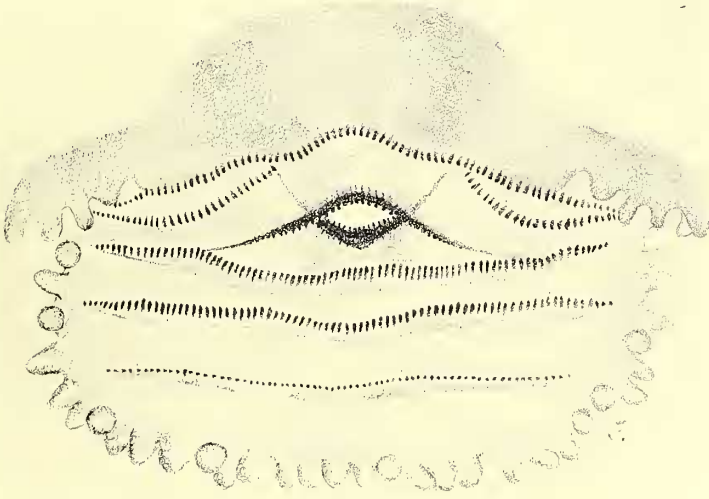


FIG. 3

NEW FROGS FROM ECUADOR AND SOUTHWESTERN COLOMBIA